Universität Regensburg

PhD positions in Synthetic Microbiology (biosensor engineering and design)

The University of Regensburg is an innovative and interdisciplinary campus university featuring innovative research and an attractive teaching programme for over 20,000 young students from different countries and disciplines. At the Faculty of Biology and Preclinical Medicine, a new research group and professorship in Synthetic Microbiology was recently founded. The team led by Prof. Dr. Markus Jeschek focusses on the development of synthetic microbes for sustainable bio-production of value-added chemicals and products. To achieve this, a broad range of microbiological and molecular biology methods including state-of-the-art DNA library generation and next-generation sequencing are applied. The combination of ultrahigh-throughput experimental data generation with state-of-the-art big data approaches (e.g. machine learning) is a core focus of the group's research. Furthermore, the professorship offers a variety of courses for students in biology, biochemistry and related disciplines.
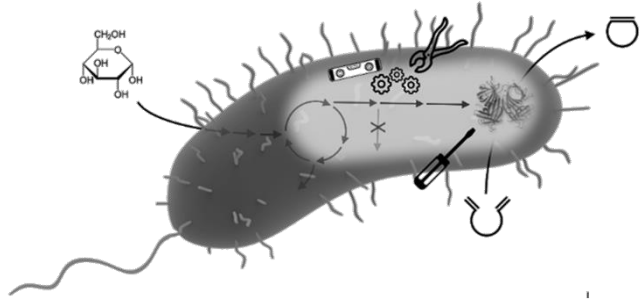
Project description: Our team specializes in the development of molecular tools and experimental techniques that enable high-throughput characterization of gene regulatory elements, proteins/enzymes and multi-protein systems in bacteria. Our vision is to precisely understand and model microbial systems using data-driven approaches in order to rationalize their engineering for sustainable bioprocesses. In this project, we will extend a new method for ultradeep Acquisition of Sequence-Phenotype Interrelations (uASPIre[1],[2]) towards the characterization of genetically-encoded biosensors in *E. coli*. Naturally, cells use such biosensors to detect environmental signals and trigger gene expression in response. This "molecular sensing" principle shall be repurposed in this project to detect and discriminate biotechnologically produced chemicals. Specifically, we will investigate and model how changes in a biosensor's sequence affect its sensory spectrum to enable biosensor design "à la carte" by combining state-of-the-art techniques for cloning and library generation with next-generation sequencing and data analysis. The designed biosensors will be used to improve production of value-added chemicals, detect and degrade pollutants, and may have a high potential for application in diagnostics and treatment.

We are looking for PhD candidates (m/w/d) with a background (MSc/diploma) in (molecular) biology, biochemistry, biotechnology or related fields, and the motivation to develop novel, sustainable solutions for bio-production. Hands-on experience in basic molecular biology techniques (cloning, bacterial cultivation, sequencing) is required. Skills in statistical analysis and/or basic programming (or the willingness to learn such skills) are desirable.

We offer a detailed on-the-job introduction, continuous mentoring throughout the PhD training and a pleasant working environment in a young and dynamic team. The possibility to supervise students and collect teaching experience is provided and encouraged. Remuneration is offered in alignment with Bavarian federal state regulations (TV-L E13). The University of Regensburg is an equal-opportunity employer and encourages applications by female and diverse candidates. In case of comparable qualification, applicants with disabilities will be treated with preference.

The positions can be filled as soon as possible and earlier applications will be treated preferentially in cases of equivalent qualification. Applications (compiled single file with CV, motivation letter and transcript/diploma) and questions regarding the PhD positions should be addressed to Prof. Dr. Markus Jeschek (markus.jeschek@ur.de).

References:
[1] Höllerer, Papaxanthos, Gumpinger, Fischer, Beisel, Borgwardt, Benenson & Jeschek. Nat. Commun. 11: 3551 (2020).
[2] Höllerer & Jeschek. bioRxiv 10.1101/2022.05.02.490318 (2022).